

Systemic Operational Design: Enhancing the Joint Operation Planning Process

**A Monograph
by
Major Victor J. Delacruz
United States Army**



**School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas**

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Major Victor J. Delacruz

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Approved by:

James J. Schneider, Ph.D. Monograph Director

Kevin C.M. Benson, COL, AR Director,
School of Advanced
Military Studies

Robert F. Baumann, Ph.D. Director,
Graduate Degree
Programs

Abstract

SYSTEMIC OPERATIONAL DESIGN (SOD): ENHANCING THE JOINT OPERATION PLANNING PROCESS (JOPP) by MAJ Victor J. Delacruz, US Army, 58 pages.

Operational level commanders and their staffs require relevant and current joint doctrine that articulates the critical function of operational design and its role in the Joint Operation Planning Process (JOPP). Since operational design is the construction of the intellectual framework that underpins operational planning, sound elements of operational design and a method to apply them are further required. Currently, Joint Publications (JP) 3-0 (Operations) and 5-0 (Joint Operation Planning) fall short of meeting these requirements, resulting in designs that lack coherence and completeness. Systemic Operational Design (SOD), an emerging methodology that has been under research by the US Army, provides a source from which a new approach to operational design can be developed and integrated into the JOPP. A new Designing Based Approach (DBA) inspired by SOD principles and driven by the need to enhance joint doctrine is proposed to in this monograph. More precisely, the DBA incorporates SOD discourse, proposes sweeping changes to the current elements of operational design, and establishes a parallel design application. Thus, SOD enhances the JOPP indirectly through the DBA.

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CHAPTER 1: INTRODUCTION

When all is said and done, it really is the commander's coup d'oeil, his ability to see things simply, to identify the whole business of war completely with himself, that is the essence of good generalship. Only if the mind works in this comprehensive fashion can it achieve the freedom it needs to dominate the events and not be dominated by them.

Clausewitz, *On War*

Senior military commanders are charged with the enormous responsibility of winning their nation's wars. With the support of their staffs, they practice one of the most comprehensive activities known as operational command.¹ They seek to understand the conditions within the operational environment, visualize the future employment of force, describe their visualization, direct actions to achieve results, assess those results, and lead forces to mission accomplishment. Accordingly, they rely heavily on theory and doctrine, among other inputs, to inform and guide them in this difficult and often unforgiving venture.

Joint and Service doctrine provide invaluable guidance for operational level commanders. Specifically, Joint Publications (JP) 3-0 (Joint Operations) and 5-0 (Joint Operation Planning) are foundational publications that provide guidance for the conduct of warfare and planning at the operational level. Both publications attempt to explain the function and application of operational design, the conception and construction of the framework that underpins an operational plan and its subsequent execution.² Unfortunately, neither publication adequately articulates operational design and its role in the Joint Operation Planning Process (JOPP). Most of the 17 elements of operational design are too force-centric, limited in application, and deterministic resulting in operational designs that lack coherence and completeness.

¹ Operational Command, in theory, is an extension of Battle Command described in FM 6-0 (Mission Command: Command and Control of Army Forces), 2003. Its basic dimensions include understand, visualize, describe, direct, lead, and assess (FM 3-0, post DRAG, 2007). Operational Command is currently undergoing research by the Army Capabilities Integration Center, Future Warfare Division, Training and Doctrine Command, and is part of an annual exercise, Unified Quest 2007.

² JP 5-0, p. IV-2.

Systemic Operational Design (SOD) is an emerging methodology that leverages the cognitive capacity of commanders and staffs in an effort to gain a more holistic understanding of the operational environment.³ With this understanding, they can better account for the complex nature of human behavior, discover more realizable objectives, act with more purpose, and respond in a manner more consistent with the evolving operational environment. SOD is a source from which a new approach to operational design can be developed and integrated into the JOPP.

This monograph aims to correct deficiencies identified in joint doctrine and exploit the potential of SOD as it relates to enhancing the JOPP specifically in the realm of operational design. A Designing Based Approach (DBA) theory is proposed which bridges that gap between SOD and joint doctrine by introducing pillars of operational design and a method to apply them, thereby enhancing the JOPP and enabling commanders and staffs.

The Problem

Joint doctrine, specifically JP 3-0 (Operations) and 5-0 (Joint Operation Planning), fall short of providing relevant and current joint doctrine that articulates the critical function of operational design and its role in the Joint Operational Planning Process (JOPP).

The Research Question

This monograph will address the primary research questions: How does joint doctrine fall short of articulating operational design? How can SOD inform and enhance the JOPP?

³ The term "cognitive" refers to a conscious intellectual activity such as thinking, reasoning, or remembering.

CHAPTER 2: DOCTRINAL CONCEPTS AND PROCESS

From a pure concept of war you might try to deduce absolute terms for the objective you should aim at and for the means of achieving it; but if you did so the continuous interaction would land you in extremes that represented nothing but a play of the imagination issuing from an almost invisible sequence of logical subtleties.

Clausewitz, *On War*

Joint Publications 3-0, *Joint Operations*, and JP 5-0, *Joint Operation Planning*, are foundational publications that provide invaluable guidance to commanders and their staffs for the conduct of warfare at the operational level. They provide the overarching constructs, principles, and fundamentals that inform a common perspective from which operational-level commanders design, plan, execute, and assess joint operations throughout the operational environment.⁴ Both publications address the critical concepts of operational art, operational planning, and operational design. This chapter discusses joint doctrinal concepts surrounding operational design and planning.

Operational Art

Operational Art is the application of creative imagination by commanders and staffs - supported by their skill, knowledge, and expertise - to design strategies, campaigns, and major operations and to organize and employ military forces.⁵ Beginning with the abstract implications of this definition, we find ourselves in the mind of the commander where in the cognitive dimension the ends, ways, and means are integrated into a coherent structure that spans from the

⁴ The operating environment (OE) is the composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander. The OE encompasses physical areas and factors (of the air, land, and maritime, and space domains) and the information environment. Included within these are the adversary, friendly, and neutral systems that are relevant to the specific joint operation. JP 3-0 (Sep 06), page II-19.

⁵ JP 3-0, Dec 06, p. IV-3.

strategic to the tactical levels of war.⁶ More precisely, combatant commanders (CCDR) and joint force commanders (JFC) interpret strategic guidance from the President of the United States (POTUS), Secretary of Defense (SecDef), and Chairman of the Joint Chiefs of Staff (CJCS) and develop estimates that directly shape subsequent design and planning efforts leading to tactical execution. Both the design informing the plan, and the plan directing the action are maintained along a heading as the operational commander wields a "directed telescope" toward the achievement of strategic ends.⁷ Hence, the commander's ability to exploit the cognitive dimension, gain a thorough and continuous understanding of the operational environment, and continually visualize the conditions required to achieve strategic objectives, represents the essence of operational art.

The staff is an extension of the commander's cognitive ability to gain a depth and breadth of understanding within the context of a specific situation. The staff is able to leverage organizational resources in order to gain knowledge and understanding that serves to influence the commander's visualization. In this role, the staff labors in the realm of ambiguity and uncertainty while employing both divergent and convergent forms of thinking. In these domains the staff has a unique opportunity to reach what Clausewitz describes as the "extremes," where "a clash of forces freely operate in such a manner as to demonstrate no obedience to any law but their own."⁸ Hence, the staff's ability to exploit the extremes represents another indispensable condition intrinsic to the concept of operational art.

⁶ The term "commander" is used broadly in this context and it refers to commanders at all levels of command beginning at the COCOM and extending down to the brigade combat team (BCT) level where a form of operational level design may occur. *Ends* are conditions required to achieve the objectives, *ways* are the sequence or courses of action likely to create the conditions; and *means* are the forces or resources required. JP 3-0, p. IV-3.

⁷ Martin Van Creveld, *Command in War*. MA: Harvard University Press, 1985) p. 75. Van Creveld uses the metaphor of a telescope used by a commander to obtain information needed to make immediate decisions.

⁸ Howard and Paret, *On War*, p. 78.

In practice, operational art permeates the thoughts and actions of commanders and staffs as they engage in warfare at the operational level. Accordingly, the associated employment of military force in such a way as to ensure a seamless linkage between ends, ways, and means takes place in a fluid environment where numerous activities occur simultaneously at all three levels of war and within geographically disbursed units. A conceptual model (see Figure 1) involving observing, receiving, planning, transferring, monitoring, and post action observation illustrates this engagement.

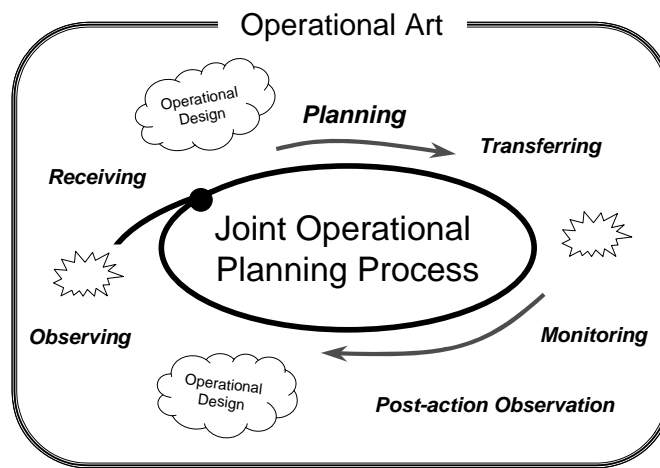


Figure 1: Command and Staff Modes of Activity

In the *observing mode*, CDRs conduct routine operations within their areas of responsibility (AOR) where conditions are acceptable to the POTUS, SecDef, and CJCS and there is no need to commit US military capabilities beyond what is already assigned. Obviously, this is the ideal and preferred state and the employment of forces is in accord with existing designs and plans requiring little adjustment. Following a destabilizing action within the AOR (represented by the multipoint graphic on the left of Figure 1), the CDR or JFC receive strategic guidance and begin to develop their estimates while their staffs initiate planning. In this *receiving mode*, commanders and their staffs have an opportunity to apply operational art to shape the expectations and requirements contained within the strategic guidance. In other words, the strategic guidance should provide enough information to enable designing and planning while at

the same time the strategic sponsor remains open for feedback from the receiving commander.⁹

The Command and Staff Modes of Activity conceptual model was developed to illustrate how thought and behavior occurs within the context of the JOPP. More precisely, each mode requires commanders and staffs to think and behave in accord with a greater framework that facilitates operational command. Of particular importance is the realization that the JOPP begins in the receiving mode, which will be discussed further in the next section.

Joint Operation Planning Process (JOPP)

The JOPP is an orderly, analytical planning process, which consists of a set of logical steps to analyze a mission; develop, analyze, and compare alternative courses of action; select the best course of action, and produce a joint operation plan or order.¹⁰ The JOPP represents a formalized procedure to produce an articulated result in the form of an integrated system of decisions.¹¹ It is not intended to be an inflexible, cumbersome process, yet like many planning or decision-making processes, particularly those used in large organizations with vast resources, the JOPP can become rather comprehensive and considerably lengthy.¹² Within the JOPP, operational art informs, guides, and inspires commanders and their staffs as they interpret strategic guidance and creatively develop comprehensive designs and coherent plans. As depicted in Figure 1, the JOPP is a continuous process influenced by operational art, enabled by

⁹ A strategic sponsor is the POTUS, SecDef, CJCS, or CCDR depending upon the level of the receiving command.

¹⁰ JP 5-0, p. III-1.

¹¹ Henry Mintzberg, *The Rise and Fall of Strategic Planning: Reconceiving Roles for Planning, Plans, Planners*. (New York: Free Press, 1994), p. 12.

¹² It is not within the scope of this chapter to excessively critique the JOPP. Rather it is appropriate to point out critiques of the planning process in general. Accordingly, this monograph will not discuss to any length the emerging joint pre-doctrinal methodologies already in practice, i.e., effects based approach (EBA), operational net assessment (ONA), political, military, economic, social, infrastructure, information, physical environment, and threats (PMESII-PT), and system of systems analysis (SOSA). Of importance is the confusion between the JOPP and the more formalized Joint Operational Planning and Execution System (JOPES), which is a system that functions exclusively at the national/strategic level.

operational design, initiated by strategic guidance, and enhanced by learning. The JOPP is discussed below not in its entirety, but as it relates to operational design.

The first step of the JOPP is titled *Initiation*.¹³ The strategic guidance received by the CCDR or JFC may arrive in several forms and have a variance of specificity. Although the guidance will generally lack all that is desired, it should at a minimum, provide a clear understanding of the strategic purpose and national strategic objectives relating to the directed or potential military operation. The strategic end state, commonly associated with political aims, should be articulated along with a military end state specific to the conflict under consideration.¹⁴ Other theater strategic information may include termination criteria, theater-strategic objectives, and strategic desired effects and assessment indicators.¹⁵

During Initiation, the CCDR or JFC and their staffs develop strategic estimates in direct response to the strategic guidance received. The commander's strategic estimate serves two primary purposes: one is for informing the SecDef about proposed military courses of action and the other is for guiding the staff. The strategic estimate includes (1) assigned objectives from the national authorities, (2) translation of national objectives to objectives applicable to combatant command or theater, (3) visualization of the strategic environment and how it relates to the accomplishment of assigned objectives, (4) assessment of the threats to accomplishment of assigned objectives, (5) assessment of strategic alternatives available, with accompanying analysis, risks, and the requirements for plans, and (6) considerations of available resources linked to accomplishment of assigned objectives.¹⁶ The CCDR or JFC may also guide the staff using Service specific processes or products that communicate their initial and continuous

¹³ JP 5-0, Figure III-3, p. III-20, JOPP Steps include: Step 1 - Initiation, Step 2 - Mission Analysis, Step 3 - Course of Action (COA) Development, Step 4 - COA Analysis and Wargaming, Step 5 - COA Comparison, Step 6 - COA Approval, and Step 7 - Plan or Order Development.

¹⁴ Ibid., p. III-5, Strategic guidance should clearly define what constitutes "victory" or success (ends), the broadly expressed conditions that should exist at the end of a campaign or operation.

¹⁵ Ibid., JP 5-0, p. III-12.

visualization of the operating environment. For example, the US Army uses the Battle Command and emerging Operational Command construct, and the USMC uses the Commander's Orientation with accompanying Commander's Battlespace Area Evaluation (CBAE).¹⁷ Thus, the strategic estimate is a tool that enables commander's to develop strategic concepts, campaign plans, and subordinate plans.

The subordinate JFC or other designated operational level commander will develop an estimate that is less comprehensive in scope than the CDR but usually more focused on the area of operation (AO) and extensively detailed. Specifically, the commander's estimate will include (1) the purpose of the operation, (2) references, (3) description of military operations, (4) mission, (5) situation and courses of action, (6) analysis of opposing courses of action, (7) comparison of friendly courses of action, and (8) recommendations or decisions.¹⁸ Similarly, the staff develops estimates that include a review of the mission and situation from their perspective, an examination of the factors and assumptions for which it is the responsible staff, an analysis of each COA to determine its supportability, and a conclusion that states whether the mission can be supported and which COA may best be supported.¹⁹ Estimates are one of many tools that enable commanders and staffs while they conduct the JOPP because they continually compare and contrast their perspectives to achieve a shared understanding of the situation. Thus, a common feature of estimates is that they reflect what is understood, visualized, and in need of continuous reassessment.

The initiation step of the JOPP triggers operational design, one of the most critical functions stemming from the practice of operational art. The strategic guidance received during this step will already provide some form of end state, objectives, or conditions, which contribute

¹⁶ JP 3-0, p. I-11.

¹⁷ FM 3-0 (DRAG-07), p. 5-2 and MCWP 5-1 (2001). As of February 2007, "battlespace" is removed from the joint lexicon. The CBAE has not been changed and will remain cited in this monograph.

to the initial framing of a problem set, a prominent feature of operational design. Framing, a key intellectual skill associated with operational art, is the creation of mental constructs that allow for the organization and synthesis of knowledge. CCDRs work to frame problems with the best information available and reframe as required.²⁰ Framing is conducted during the JOPP and heavily informed during execution. Therefore, the receipt of strategic guidance, the development of estimates, and the exercise of framing, represent one immediate application of operational design - the supporting framework that will compliment and enable the JOPP.

Designing and planning are often described as two separate activities. In fact, Army Field Manual (FM) 3-24, *Counterinsurgency*, describes design as "problem-setting, conceptual, paradigm-setting, and commander-driven."²¹ Conversely, planning is "problem-solving, physical and detailed, paradigm-accepting, and staff-centered."²² While it is important to understand the distinction between these two activities, it is also important to understand that in practice they coexist. For instance, designing is a process whereby commanders and staffs use design elements selectively to visualize the arrangement of actions in time, space, and purpose.²³ One objective of designing is to exploit divergent thinking to produce a design that informs and underpins a coherent plan. Planning is a more formalized and structured process whereby visions or designs are translated into concrete and precise actions. One objective of planning is to exploit convergent thinking to produce a coherent plan that directs actual execution. Using the modes of activity model, it becomes apparent that in practice designing occurs throughout the planning process. The resulting design and plan are therefore in a continual state of validation and reassessment as the understanding of a problem evolves. Further, during the JOPP, commanders

¹⁸ JP 5-0, p. III-52.

¹⁹ Ibid., p. III-52.

²⁰ Ibid., p. III-5.

²¹ FM 3-24, p. 4-2.

²² Ibid.

²³ JP 3-0, *Joint Operations*, p. IV-4.

and staffs exercise divergent and convergent thinking simultaneously. Hence, any effort to maintain a dichotomy between designing and planning runs counter to the objective of achieving a coherent plan.

The second step of the JOPP is titled, *Mission Analysis*. This comprehensive 15-part step requires the commander and staff to conduct extensive research and analysis to gain a thorough understanding of the problem and the purpose of the operation. This step is clearly information intense and every effort must be made to gather relevant information, analyze that information to develop knowledge, and finally synthesize that knowledge to gain an understanding of the specific situation and operational environment. Figure 2 illustrates how raw data is transformed into understanding by the addition of meaning at each level.

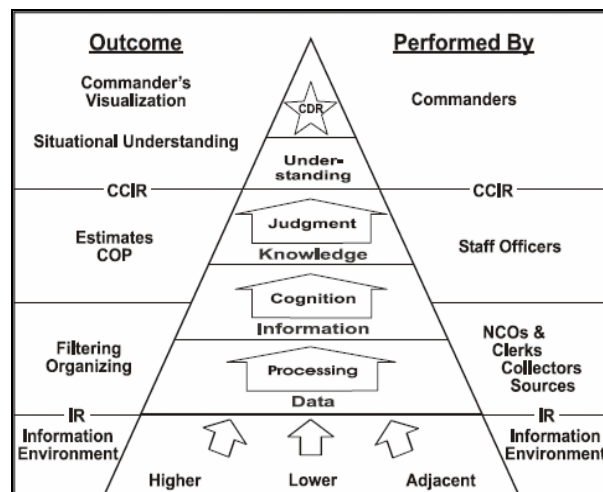


Figure 2: Cognitive Hierarchy ²⁴

Data comes from various sources within the operational environment. Basic processing methods organize, filter, and arrange the data resulting in a portion of it becoming information. Methods of analysis and evaluation convert targeted information to knowledge, which populate

²⁴ Source: FM 6-0, Mission Command, p. 3-14. The basic cognitive hierarchy is represented by the center triangle with data at the bottom and understanding at the top. The additional information serves to support the example cited.

running command and staff estimates in addition to updating the common operational picture (COP).²⁵ Finally, judgment is applied to knowledge to achieve greater understanding. Figure 2 emphasizes the importance of the commander achieving the highest form of understanding, however this is not restricted to the operational commander. For instance, FM 6-0 (Mission Command) provides an example of a platoon leader collecting data, processing data into information, applying existing knowledge, analyzing meaning, evaluating effects, learning and integrating, and finally applying judgment to gain true understanding of the situation. Therefore, the concept of cognition at all levels cannot be overemphasized during mission analysis for it is within the cognitive dimension that commanders and staffs think, perceive, visualize, and decide. The concepts of cognition, operational art, and operational design are all interrelated and integral to the JOPP.

This chapter briefly discussed key doctrinal concepts to include operational art, operational design, and operational planning. The importance of estimates was emphasized and the function of framing was introduced. A diagram depicting command and staff modes of activity was presented to illustrate terms and concepts integral to operational art and the planning process in general. A discussion on designing, a design, planning, and a plan was provided to ensure each term and its context are understood. Finally, two conceptual models provided a means to understand how the doctrinal concepts coexist. The next chapter will explain and critique the elements of operational design as they are currently expressed in joint doctrine.

²⁵ COP - an operational picture tailored to the user's requirements, based on common data and information shared by more than one command. FM 3-0 DRAG, p. G-5.

CHAPTER 3: ELEMENTS OF OPERATIONAL DESIGN

The current elements of operational design might no longer be sufficient to enable the effective planning and execution of campaigns and major operations across the full spectrum of operations.

Colonel James K. Greer²⁶

Operational design, the construction of the supporting framework that underpins an operational level plan, involves the consideration of 17 individual design elements (see Figure 3). The list of elements represents a collection of concepts that may be useful to commanders and staffs as they visualize the arrangement of capabilities in time, space, and purpose to accomplish a mission. According to JP 5-0, *Joint Operation Planning Process*, the key to operational design involves (1) understanding the strategic guidance, (2) identifying the adversary's principal strengths and weaknesses, and (3) developing an operational concept that will achieve strategic and operational objectives.²⁷ The elements were developed in light of these three broad requirements.

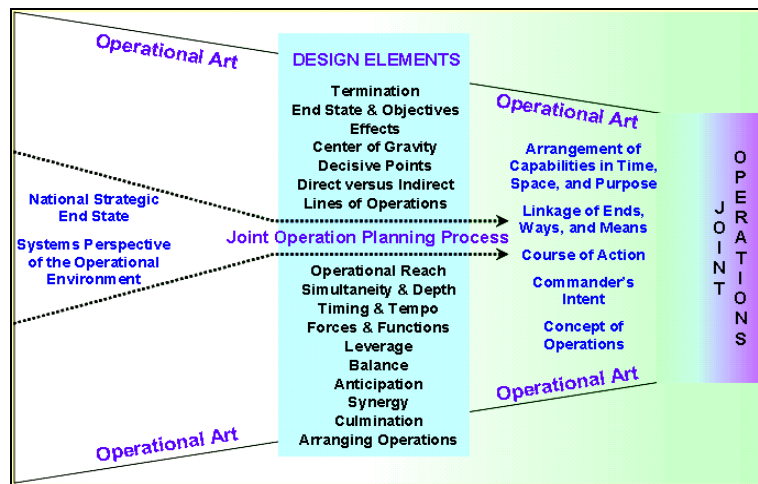


Figure 3: Operational Art and Design within the JOPP²⁸

²⁶ James K. Greer, "Operational Art for the Objective Force" (Military Review, September-October 2002), p. 25.

²⁷ JP 5-0, p. IV-2.

²⁸ Source: JP 5-0

The elements of operational design have evolved over time as commanders have struggled to understand and engage in warfare. While not described in the exact terms, design elements have informed military planning for over two millennia. For instance, Sun Tzu, a notable Chinese general and philosopher, wrote in the six century B.C., "that one should seek victory in the shortest possible time, with the least possible effort, and at the least cost in casualties to one's enemy."²⁹ Additionally, Sun Tzu codified strategic actions guiding commanders to "attack weaknesses, avoid strengths, and be patient."³⁰ By comparing Sun Tzu's words to the current elements of operational design, it is plausible to conclude that designing is not a new concept.

The elements of operational design are unique and they should be considered individually, however for the purpose of this evaluation, they will be combined into one of four major groupings. First, the *guiding elements* include termination, end state and objectives, lines of operation, and direct and indirect approaches. These elements guide the thoughts of commanders and staffs as they seek to link strategic ends to tactical means. Second, the *system elements* include center of gravity, effects, and decisive points. These elements refer to the major entities requiring focused analysis. Third, the *time and distance elements* include simultaneity and depth, timing and tempo, operational reach, culmination, and arranging operations. These elements provide the context within which all actions will be bounded. Fourth, the *execution elements* include forces and functions, leverage, anticipation, balance, and synergy. These elements refer to considerations that characterize the application of a design. A brief discussion and critique of each element follows in the same sequence as detailed above.

²⁹ Peter Paret, *Makers of Modern Strategy from Machiavelli to the Nuclear Age*, (Princeton, NJ: Princeton University Press, 1986), p. 800.

³⁰ Ibid., p. 823.

Guiding Elements

Termination is the design element that establishes criteria (termination criteria) for the cessation of military operations in a particular operational environment. Since backward planning is a hallmark of joint operational planning, the concept of clearly defining termination criteria represents a necessary starting point for designing and planning. The aim of termination and termination criteria is to determine that point in time, space, and purpose where conditions are met to such an extent that the conditions will endure and the advantages gained will preserve.³¹

While termination is directly related to the military instrument, it must be considerate of numerous other operational actors including coalition and multinational partners, government agencies (GA), other government agencies (OGA), intergovernmental organizations (IGO), and non-governmental organizations (NGO). These actors will also have expectations and vested interests, which are likely to be affected by the disengagement and redeployment of military forces. Realizing the need to consider the remaining operational actors as well as the partner nation, CCDRs are permitted to formulate and propose termination criteria for approval by the POTUS and SecDef.

The relevance of termination and its associated termination criteria are in question. First, termination requires strategic guidance to be so clear in its national strategic end state specific to a contingency or conflict, that operational commanders can then develop nested military strategic objectives and military end states.³² Historically, strategic guidance and the strategic end state in particular, have fallen drastically short of providing such clarity leaving the military instrument of power to rely more on their determined military end states, which may not fully address the

³¹ JP 5-0, p. III-9.

specific contingency or conflict. Recent trends over the past 50 years reveal that some end states have simply been unachievable and the conflicts tend to be timeless.³³

The actual point at which military operations will no longer be required to enable the achievement of national interests remains a political quagmire. For instance, the military instrument can only set the conditions upon which the political objective can be achieved yet the political objective may require the willing cooperation of the majority of the partner nation populace whom may despise the presence of an occupying military force.³⁴ Termination criteria are redundant because they are derived from conditions, which in turn are derived from desired end states. Provided the end state includes conditions that address termination, termination as an operational design element is no longer required. Lastly, if termination is meant to be a trigger for the redeployment of forces then it is merely one of many components within strategic guidance. Termination may therefore be an important component of strategic guidance according to joint doctrine, however there appears to be no warrant for it to stand as an individual operational design element.

End states are created at all levels of war and they represent sets of conditions that define the achievement of objectives. The National Defense Strategy (NDS) and the National Military Strategy (NMS) contain broad standing strategic objectives that inform and guide strategic military end states. However, in response to a particular contingency or conflict, a specific set of national strategic objectives should be developed which will then directly influence the military end state. For example, the JP 5-0 vignette describes a national security objective to "reestablish

³² Nesting is a planning technique to achieve unity of purpose whereby each succeeding echelon's concept of operation is embedded in the other (FM 5-0, Army Planning and Orders Production, Jan 2005), p. G-14.

³³ Rupert Smith, *The Utility of Force: The Art of War in the Modern World*, (New York: Knopf Publishing, 2007), p. 291.

³⁴ *Ibid.*, pp. 272-273.

the conditions for a secure and stable region."³⁵ Once achieved, this objective and its related conditions represent a military end state that may be stated as, "regional security and stability are reestablished." Clearly defined military end states enable unity of effort, integration, synchronization, and risk mitigation. Lastly, end states, particularly strategic and operational, are not static and they may evolve based on conditions in the operational environment.

The relevance of end states cannot be overstated. Their determination requires national and military leaders to crystallize their visualizations and provide clear guidance for the conduct of campaign or major operational planning. Clearly defined end states reduce the need for termination criteria and their creation and evolution reflects the application of operational art at all levels. However, the potential exists for end states to be overly deterministic resulting in irrational and faulty decisions. Because there is such a focus and personal investment in end states, they stand the great risk of becoming dogmatic leading decision makers down a tragic path. For instance, in the book, *Cobra II: The Inside Story of the Invasion and Occupation of Iraq*, authors Gordon and Trainor explain how Secretary Rumsfeld and General Franks were so committed to the prewar plan that they both made poor decisions leading to the creation of an insurgency that continues to plague the war over four years after the declared end of major combat operations.³⁶

While end states may run the risk of being overly deterministic, there is a potential for them to be an impractical and unreliable design element. For instance, the Global War on Terror (GWOT) has been clearly described as a long war in the 2006 National Strategy for Combating Terrorism with no practical end on the horizon. In fact, implied end states include (1) democratic governments established in nation states and other similar governing entities, (2) global terrorist

³⁵ JP 5-0, III-6.

³⁶ Michael R. Gordon and Bernard E. Trainor, *Cobra II: The Inside Story of the Invasion and Occupation of Iraq*. NY: Pantheon Books, 2006), p. 500-502.

networks unable to conduct attacks in the United States, (3) rogue states and terrorist allies denied weapons of mass destruction (WMD), (4) terrorist denied the support and sanctuary of rogue states, (5) terrorist denied control of any nation for use as a base, and (6) institutions and structures created to carry the fight forward against terror. These end states are sweeping and almost incomprehensible. In his book, *Empire Lite*, Michael Ignatieff asserts that the "American military knows it has begun a campaign without an obvious end in sight."³⁷ If strategic guidance is based on an endless war, then the related military end states specific to the contingency or crisis are essentially interim end states embedded in false ones. Thus, end states can be overly deterministic and limited in application when conducting operational design.

Objectives are the clearly defined, decisive, and attainable goals toward which every military operation should be directed.³⁸ They are considered part of the design element, *end state and objectives*. JP 3-0 explains how termination criteria are established first, end states second, and objectives third, with the two main types of objectives being strategic (campaign level) and operational (major operational level). Strategic military objectives are broad in scope including not only military objectives, but also political, informational, economic, and social objectives. Great care must be taken to ensure that objectives are realistic and attainable, otherwise military effort will be wasted.³⁹ Because military operations are only a part of the larger national strategic context, the focus on strategic military objectives is one of the most important considerations in operational design. Operational level objectives are often military specific and physical in nature involving the destruction or neutralization of enemy combat forces. Objectives reflect goals, create conditions, and inform actions all of which are critical to operational design. Thus,

³⁷ Michael Ignatieff. *Empire Lite*, (London: Vintage, 2003), p. 4.

³⁸ JP 3-0, p. III-11.

³⁹ Milan Vego, *Operational Warfare*, (Newport, RI: Naval War College, 2000), p. 471.

objectives are relevant, necessary, and applicable elements of operational design, that serve to inform and enable commanders and staffs.

Lines of operation (LOO) can be described as physical, logical, or both. They are valuable and unique in that they allow commanders to communicate their visualization and intent in a textual and graphical form. First, physical LOOs are either interior (operations that diverge from a central point), or exterior (operations that converge upon a single point). They are used primarily at the tactical level of maneuver but could be used at the operational level. Physical LOOs determined at the operational level are force centric with the potential to be overly prescriptive. Second, logical LOOs depict a logical arrangement of objectives, effects, or tasks and they are especially useful when working with interagency or multinational partners.⁴⁰ For instance, logical LOOs were used with considerable success by Task Force Baghdad leading up to the Iraqi 2005 elections where operations were characterized by the participation of coalition, multinational, and multi-agency participation.⁴¹ Logical LOOs are ideal for strategic and operational design and planning where concepts more than physical considerations drive the processes. Hence, physical LOOs have some utility during operational design but are limited in application while logical lines have a remarkable range of application.

Friendly forces must determine the manner in which they will allocate and employ their resources to achieve victory over an adversary. A *direct approach* involves the maneuver of forces directly towards the strongest and most critical enemy force. This approach in theory provides the most direct path to victory. The *indirect approach* involves attacks against supporting elements of the enemy force in order to weaken it and set the conditions for a direct approach. Both direct and indirect approaches are used primarily at the tactical level and they are

⁴⁰ JP 5-0, p. IV-21.

⁴¹ Peter W Chiarelli & Patrick R. Michaelis, "Winning the Peace: The Requirements for Full Spectrum Operations", *Military Review*. (July - August 2005), p. 8.

force centric as described in joint and Service doctrine. Similarly, at the operational level, the approaches are force centric with the potential to be overly prescriptive.

System Elements

Centers of gravity (COG) can be viewed as the set of characteristics, capabilities, and sources of power from which a system derives its moral or physical strength, freedom of action, and will to act. The identification of COGs is possible mostly at the strategic and operational levels of war. For instance, at the strategic level, a COG could be an alliance, political or military leaders, or national will. At the operational level, a COG is normally an adversary's military capabilities. At the tactical level, the concept of a COG has little usefulness because its tactical equivalent is the objective.⁴² COGs are not necessarily static and can shift based on changes in end states, missions, objectives, and adversary strategies. Subordinate COG constructs include critical capabilities, critical requirements, and critical vulnerabilities. Lastly, the essence of operational art lies in being able to produce the right combination of effects in time, space, and purpose relative to a COG to neutralize, weaken or destroy it to achieve military objectives and attain the military end state.⁴³

COGs are extremely useful during operational design. Their careful determination is one of the most important tasks confronting operational commanders and staffs. Since they are linked to the theater-strategic objectives, COGs enable operational commanders and staffs to focus their efforts on those key entities within an adversary system, thereby ensuring the purposeful and effective employment of force. However, it would be overly presumptuous to assume that a COG exists in every system. Consider the increasing likelihood that COGs may not be relevant in the current GWOT. In his book, *The Utility of Force*, General Rupert Smith posits that "war itself

⁴² FM 3-0 DRAG, p. 6-36.

⁴³ JP 5-0, pp. IV-8 to IV-10.

may no longer exist" in the way it has always been defined and understood and new paradigms may need to be embraced pushing traditional methods to the side.⁴⁴ One only needs to consider the terrorist group Al Qaeda where even if its leaders were removed, the extensive global network would likely continue to function. While the potential exists for COGs to be limited in their application, in general, they remain quite relevant and useful for the conduct of operational design.

Effects are the physical and/or behavioral state of a system that results from an action, a set of actions, or another effect. Effects serve to link military objectives to specific tasks thereby enabling commanders and staffs to visualize the conditions for achieving objectives. While objectives direct a form of action, effects describe the desired results and facilitate a means by which the achievement of objectives can be determined and assessed. To determine effects with precision represents operational art and design at its zenith largely because a meticulous grasp of an operational environment must first exist. For instance, an effects-based approach (EBA) equates an operational environment to a system where specific nodes can be identified and acted upon to produce desired effects.⁴⁵ Perceptibly, the degree to which a system is understood will impact the degree to which an effect can be predicted and its cause determined accordingly. Judea Pearl, a prominent scientist, asserts that causality is not mystical or metaphysical, it could be understood in terms of simple processes, and the power of symbols and mathematics should not be underestimated.⁴⁶ In other words, it is possible to develop a system that reveals cause and effect linkages with a high degree of probability. Hence, efforts to describe and understand a system lead to sound decision-making and increased likelihood for military success.

⁴⁴ Rupert Smith, *The Utility of Force*, (New York: Knopf Publishing, 2007), p. 3.

⁴⁵ JP 5-0, p. GL-11. A node is defined as an element of a system that represents a person, place, or physical thing.

⁴⁶ Judea Pearl, "The Art and Science of Cause and Effect" in *Aspects of Campaign Planning*. (US Army Command and General Staff College, SAMS Reading C20, February 2002), p. 331.

The extent to which effects are useful during operational design is in question. First, effects are deterministic meaning that they are an outcome from a cause, neither of which has occurred. The term, deterministic, is used here in the pejorative sense because effects are often used to justify actions that rely heavily on the accurateness of predicted effects. In other words, a projection of events must be made that cannot be determined with absolute certainty suggesting that the application of effects is limited and potentially impractical. Second, joint doctrine acknowledges that the proximate cause of effects in interactively complex situations can be difficult to create, predict, and measure, particularly when they relate to moral and cognitive issues.⁴⁷ Third, effects are a projection that relies on the efficacy of an associated system that is a mere model of physical realities and human behavior. Fourth, an effects-based approach is the antithesis of operational thinking and practice because it views warfare more as a science than both a science and an art.⁴⁸ Lastly, effects are associated with the EBA, an approach that is currently under considerable debate and doctrinally stagnated. Thus, effects can be overly deterministic, limited in application, and difficult to consider during the conduct of operational design.

Decisive points are the geographic places, specific key events, critical factors or functions that when acted upon allow commanders to gain a marked advantage over an adversary or contributes materially to achieving success.⁴⁹ During campaign design, the successful outcome of a particular battle or a specific event represents a milestone along the journey to victory. Viewing these milestones as decisive points enables commanders and staffs to visualize marginal progress and make necessary adjustments during execution. Appropriately determined decisive points are keys to attacking or protecting COGs and as decisive points are successfully engaged

⁴⁷ JP 5-0, p. III-15.

⁴⁸ Milan N. Vego, "Effects-Based Operations: A Critique." *Joint Forces Quarterly*. Issue 41 (Spring 2006): p. 51.

others may be exposed. Finally, the art of identifying and prioritizing decisive points is a critical part of operational design because normally there are far more decisive points in a particular operational area than can be attacked, seized, retained, or controlled with the forces and capabilities available.⁵⁰ Thus, decisive points apply to the strategic and operational levels of war and remain quite relevant during the conduct of operational design.

Timing and Distance Elements

Simultaneity and depth is the simultaneous application of military and nonmilitary capabilities toward enemy key capabilities in order to bring about their collapse. Depth refers to the ability to strike deep within and throughout the operating environment to overwhelm the enemy and cause a speedy defeat. A premium is placed on having a shared understanding of the operational environment to mitigate risk and enable successful operations. Simultaneity and depth are major tactical and operational considerations integral to the development of any operational plan and relevant during the conduct of operational design.

Timing and tempo refers to the conduct of operations at a tempo and point in time that best exploits friendly capabilities and inhibits the adversary. Taking actions at the proper time will allow friendly forces to maintain a dominant role, remain unpredictable and operate beyond the adversary's ability to react. Tempo, the rate of military action, allows the commander to speed up or slow down the pace of operations as needed. The timing and tempo elements initially have a strategic and operational application especially during deployment, however once forces are in theater the application mostly refers to tactical activity. Timing and tempo are therefore relevant during the conduct of operational design.

⁴⁹ JP 5-0, p. IV-16.

⁵⁰ Ibid., p. IV-16.

Operational reach refers to the distance and duration across which an operational level force can employ military capabilities. The concept of distance requires commanders and staffs to consider the location of forces, reserves, bases, pre-positioned equipment sets, and logistics forward to ensure operational reach does not limit envisioned operations. Given the expeditionary capabilities of the United States military, this element has enormous strategic and operational applicability. Duration, however, is more problematic due to current military operations that transition to open-ended stability operations with no clearly defined end.⁵¹ Operational reach is therefore relevant during the conduct of operational design.

Culmination is the point at which a force no longer has the capability to continue its form of operations and defeat is implied. Therefore, culmination is a reality that represents the ultimate risk to opposing forces. The physical and nonphysical factors that influence culmination must be continuously assessed as operations unfold. For instance, the prudent management of resources may mitigate physical factors. However, nonphysical factors such as the erosion of national will, decline of popular support, and questions concerning legitimacy or restraint may be more difficult to mitigate. Culmination is therefore relevant during the conduct of operational design.

Arranging operations refer to the manner in which commanders and their staffs organize, assign, and employ forces across time and space in order to accomplish their assigned mission. A variety of factors must be considered to include the geography of the operational area, available strategic lift, Service-unique deployment capabilities, diplomatic agreements, changes in command structure, protection, level and type of OGA and NGO participation, distribution and sustainment capabilities, enemy reinforcement capabilities, and public opinion.⁵² Arranging

⁵¹ Rupert Smith, *The Utility of Force*, (New York: Knopf Publishing, 2007), p. 291.

⁵² JP 3-0, p. IV-19.

operations include phasing in addition to branch and sequel planning. Arranging operations are therefore relevant during the conduct of operational design.

Execution Elements

Forces and functions refer to the manner in which commanders elect to focus military effort on forces (enemy forces), functions (i.e., enemy C2, logistics, air and missile defense), or a combination of both. From a strategic perspective, this element has some utility when it is considered along with COGs and decisive points. From an operational perspective, this element has utility when considered along with direct and indirect approaches, physical lines of operation, operational reach, culmination, timing, and tempo. However, the need to specify precisely where and when a force should be directed belongs more in the tactical realm. Forces and functions are therefore relevant however their application during operational design is limited.

Leverage, the centerpiece of joint operational art, refers to the relative advantage in combat power or other circumstances against an adversary across one or more domains (air, land, sea, and space) and/or the information environment sufficient to exploit that advantage.⁵³

Leverage allows commander to impose their will on the enemy, increase the enemy's dilemma, and maintain the initiative. Hence, leverage has an application across all levels of war and is therefore relevant during the conduct of operational design.

Anticipation is a conceptual posture where commanders and staffs consider what might happen while looking for signs that may bring the possible events to pass. It is a posture that is execution oriented with the goal of ensuring that surprise is avoided and initiative exploited. Knowledge of the adversary before and during operations enables commanders and staffs to more effectively anticipate. Anticipation has an application across all levels of war and is therefore relevant during the conduct of operational design.

Balance refers to the appropriate mix of forces and capabilities within the joint force as well as to the nature and timing of operations. Balance is the maintenance of force, its capabilities, and its operations in such a manner as to contribute to freedom of action and responsiveness.⁵⁴ Balance is execution oriented with the goal of preserving responsiveness and options for the commander. Balance has an application across all levels of war and is therefore relevant during the conduct of operational design.

Synergy is the employment of conventional and unconventional forces across the range of military operations in a synchronized and integrated fashion resulting in greater combat power and operational effectiveness. Since synergies are extremely difficult to predict, their creation reflects operational art in its truest form. More precisely, the creation of synergies enables the ways that effectively employ the means to achieve the ends. Synergy is therefore relevant during the conduct of operational design.

Assessment

The elements of operational design as articulated in joint doctrine are supposed to help commanders and staffs visualize what the operation should look like. This visualization once achieved ensures a clear focus on objectives and enables the effective employment of both military and nonmilitary resources. Provided the design is sound, victory (ends) is possible because the appropriate resources (means) are employed in the correct manner (ways) across the levels of war. However, most of the 17 elements, as defined and applied in joint doctrine, are either too force centric, overly deterministic, or simply not relevant for various other reasons.⁵⁵ Additionally, the elements of operational design are not adequately linked to estimates or the JOPP thereby reducing their relevance and overall applicability.

⁵³ JP 5-0, p. IV-26.

⁵⁴ Ibid., p. IV-27.

The elements categorize in to four major groups that begin to suggest how they may be conceived and applied. First, the *guiding elements* provide invaluable knowledge enabling initial problem framing and concept nesting. Second, the *system elements* focus commanders and staffs in areas that directly support the adversary. Third, the *time and distance elements* bound projected actions. Lastly, the *execution elements* suggest mental models to stimulate creative thinking. Of all of the elements, only end states and objectives, logical lines of operation, center of gravity, simultaneity and depth merit inclusion into what would be sound and highly relevant elements of operational design. The next chapter will introduce another methodology that approaches operational design from a different perspective. It does not rely on elements that can be selected from a menu nor does it distance itself from the estimates or the JOPP. Rather, this methodology seeks to crystallize estimates and ultimately enhance the JOPP.

⁵⁵ Appendix II (EOD Assessment) provides a one-page roll up for quick reference.

CHAPTER 4: SYSTEMIC OPERATIONAL DESIGN

Designers seek to choose rather than to predict the future. They try to understand rational, emotional, and cultural dimensions of choice and to produce a design that satisfies a multitude of functions.

Jamshid Gharajedaghi, *Systems Thinking*

Systemic Operational Design (SOD) is a military methodology created by Israeli Brigadier General (Reserve) Shimon Naveh and his colleagues at the Operational Theory Research Institute (OTRI) in the late 1990s. SOD is broadly defined as a structured method of inquiry that reflects the application of systems theory to operational art whereby complexity is rationalized. SOD is another representation of operational art - the application of creative imagination by commanders and staffs to design strategies, campaigns, and major operations and to organize and employ military forces.

SOD Theory

SOD is a structured method of inquiry that enables the commander to make sense of a complex situation, capture that understanding, and share a resulting visualization.⁵⁶ Systems thinking enables SOD by providing a framework where mental models can be built, relationships between system components can be uncovered, and patterns of behavior can be determined. Both the relationships within the system and the factors that influence them enable the construction and understanding of the underlying system logic.⁵⁷ With an understanding of system logic and the essential system structure, leverage points can be identified and acted upon to effect change within the system. A brief summary of the SOD model follows.

SOD begins with the engagement of a complex problem that needs to be framed. According to systems theory, this complex problem represents a disturbance in a system that

⁵⁶ Yancy, *SOD Primer*, 2006, p. 18.

causes the movement of a system away from a "steady state."⁵⁸ A rigorous inquiry characterized by creative thinking results in the discovery of emergences and relationships within the system. To comprehend the system, visual mapping and narratives are created. An increased understanding of the system allows for the discovery of potential opportunities, risks associated with actions to exploit those opportunities, and measures to ensure self-regulation of the system after action has been taken. The SOD design is translated into a plan, the plan is executed, and the results are assessed as they relate to the system. Finally, the problem is reframed and the process is repeated until the problem has been adequately addressed.

The Discourse

In general, people communicate verbally in a routine and often responsive manner. How people communicate depends upon the particular roles they are in at the time of the communication and the demands of the situation. While communication results in an exchange of information, the degree to which that information is insightful or useful will vary. In the context of military operations, communication occurs at strategic, operational, and tactical staff levels where a culture and hierarchical organization impose implicit and explicit control measures that often limit the degree to which high quality communications can be achieved. Specific to operational design as described in joint and Service doctrine, this communication is constrained by processes that are product oriented resulting in mission analysis briefings, course of action briefings, decision briefings, commander's intent statements, and other products that seek to use knowledge to match solutions to perceived problems.

⁵⁷ Yancy, *SOD Primer*, 2006, p. 18.

⁵⁸ Bertalanffy, Ludwig von, *General System Theory; Foundations, Development, Applications* (New York: George Braziller, 1969) p. 142.

In contrast, discourse is a more sophisticated form of communication where the purpose is to gain insight and to go beyond the understanding of any one individual.⁵⁹ At its core, discourse is an interactive learning session involving an ongoing process of inquiry with constructive criticism that questions everything. The dialectic dynamic of thesis-antithesis-synthesis executed in an egalitarian environment serves to bring out deep cognition that floats ideas into consideration and eventual form. The aim of the discourse is to create insights relating to the problem set and to gain a shared understanding of an entire system. Discourse allows a synthesis of ideas that is greater than the sum of its parts. Hence, the collective thinking achieved during discourse represents an ongoing stream where thoughts are like leaves floating on the surface that wash up on the banks.⁶⁰ An experienced discourse group will easily create the stream after developing a sensitivity which enables them to cast a fine net capable of gathering in subtle meanings in the flow of thinking - this sensitivity lies at the root of real intelligence.⁶¹

Discourse is not an easy task because social conditioning and other behavioral-related variables already influence the way people think and speak. Specifically, social conditions tend to instigate and confirm wrong habits of thinking by authority, conscious instruction, and the even more insidious half-conscious influences of language, imitation, sympathy, and suggestion.⁶² Cultural bias and anchoring further inhibit creative and unconstrained thinking. Discourse is therefore a skill that must be learned through study and practice. Those involved in the discourse are individually challenged to exercise exceptional discipline, judgment, and creativity.⁶³

⁵⁹ Peter Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday/Currency, 2006), p. 223.

⁶⁰ Ibid., p. 225

⁶¹ Ibid., p. 225.

⁶² John Dewey. *How We Think*. Mineola, (NY: Dover Publications, 1997), p. 25.

⁶³ Naveh, 22 Feb 2007.

The Process

SOD is conducted by a small group of people consisting of the operational commander, select staff, and external experts as needed. This small group is called a design team and it is led by discourse leaders and managed by a discourse facilitator. The SOD process involves seven domains of structured discourse (see Figure 4). Although the diagram is bounded by one domain with a symbol directed towards an inner domain, the process does not dictate the order in which the discourse domains should be addressed. For example, when insights are gained in one domain, the team may decide to revisit another domain to ensure a shared common understanding across all domains. An "increase in the store of meanings, makes us conscious of the new problems, while only through translation of the new perplexities into what is already familiar or plain do we understand or solve these problems."⁶⁴ This natural tendency to cognitively maneuver around the domains during discourse is a valuable feature of SOD.

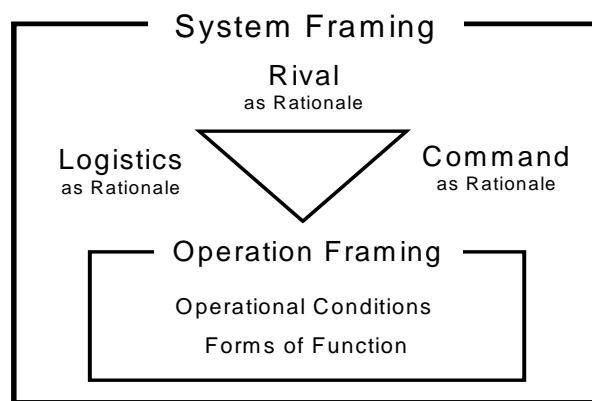


Figure 4: Systemic Operational Design Overview⁶⁵

System Framing is the first domain of structured discourse. As the name suggests, a system is cognitively created and defined through discourse to such an extent that it is bounded thereby enabling the design team to rationalize, problematize, and map numerous associated

⁶⁴ John Dewey, *How We Think*, (Mineola, NY: Dover Publications, 1997), p. 120.

⁶⁵ Source: SOD Operational Command Workshop, Feb 2007.

entities.⁶⁶ Initially, the design team carefully considers the strategic directives as they go about rationalizing the system setting. Emergences, anything that is new in the system, are mentally constructed during the discourse and the design team seeks to understand their origins, meanings, and implications within the system. The system initially consists of actors who are conceptualized and placed into context consistent with a developing narrative. To assist in this conceptualization, visual mapping is conducted (see Figure 5).

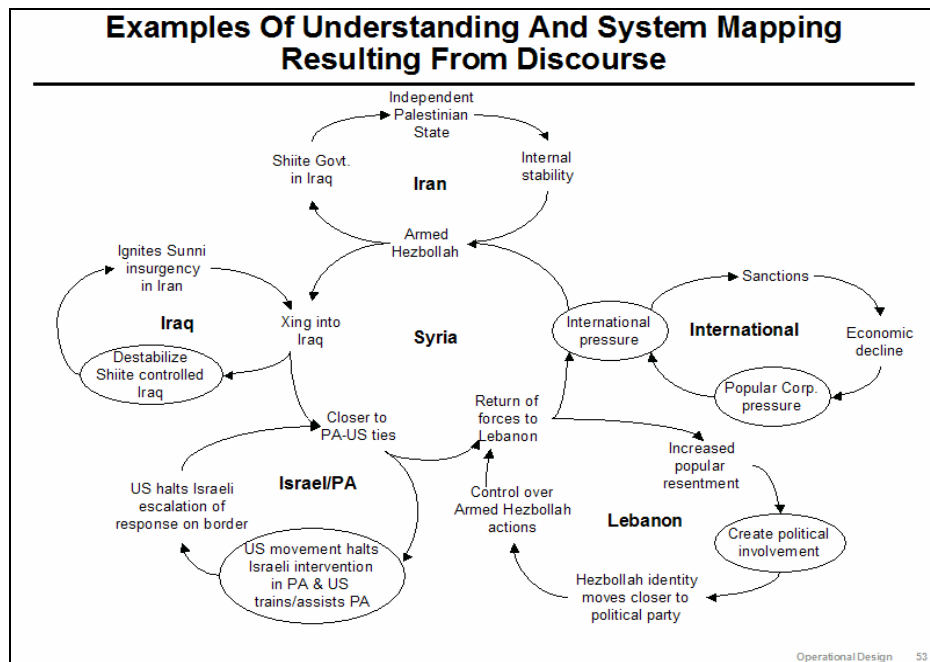


Figure 5: Example of Visual Mapping⁶⁷

Visual mapping is critical to SOD and it begins during system framing as a compliment to the discourse. It represents the learning that is occurring during the discourse and it should not

⁶⁶ Rationalizing is how the design team comes to makes sense of the situation by taking its contexts and creating the logic to understand actors and other entities in the system frame. Problematising is the mental exercise that enables the design team to manipulate the strategic context in order to gain an understanding of unacceptable conditions in their entirety. More precisely, problematising involves the formulation of the problem versus the solving of it.

⁶⁷ Yancy, *SOD Primer*, 2006

be viewed as a static picture.⁶⁸ Rather, it is a living visual representation that reflects the collective cognition of the design team. While Figure 5 is far from meeting most of the principles for graphical excellence, it meets one of the most important principles of all - revealing the known truth about the information.⁶⁹

Opponents of SOD will be quick to criticize the visual mapping effort as inferior to that offered by other methods, in particular the PMESI-PT construct associated with ONA and EBA.⁷⁰ They could not be farther from point. While other methods produce in-depth system models complete with subsystems, linkages, and even nodes; the models lack a logical and meaningful narrative reflective of the true rationale of the adversary and are more likely to steer appropriate action within an open system.⁷¹ In other words, the models represent the thinking of others, which should not be accepted at face value. Recipients rarely experience that deep sense of ownership or deep insight towards models and products that are given to them. SOD is unique in that it is not a fundamentally analytical methodology that sets out to isolate and breakdown the whole. SOD simply realizes that the whole is too large and complex to be dealt with, by even a sizeable coalition of competitors, without artificial logical boundaries.⁷²

In order to achieve a logical and meaningful narrative, the design team must continually strive to frame the emerging context, explore logical trends, and determine possible meanings of

⁶⁸ Shimon Naveh, a retired Israeli Defense Force general officer, is the developer and leading proponent of Systemic Operational Design (SOD) and author of *In Pursuit of Military Excellence: The Evolution of Operational Theory*. Comments received during SOD Workshop, 22 Feb 2007.

⁶⁹ Edward R. Tufte, *The Visual Display of Quantitative Information*, 2nd ed. (Graphics Press LLC, Cheshire, Connecticut, 2001), p. 51.

⁷⁰ Political, Military, Economic, Social, Infrastructure, and Information, Physical environment, and Threats (PMESI-PT), Operational Net Assessment (ONA), and Effects Based Approach (EBA).

⁷¹ Open systems are defined as a system in exchange of matter with its environment, presenting import and export, building-up, and breaking down of its material components. Open systems approach a time-independent state, the so-called steady state as opposed to a system in equilibrium. Ludwig von Bertalanffy, *General System Theory; Foundations, Development, Applications*. (George Braziller, New York: 1969). p., 141.

unique events and circumstances in the system. The discourse cannot become a discussion, where the conditions for learning are far from optimal; rather the discourse is about textualization and creating the engagement and conditions for learning within the design team.⁷³ Through effective discourse, the design team will rationalize strategic guidance, gain an understanding of the actors and their interests, understand the rationale embedded in the disturbed system, and develop a conceptual framework that will enable continued learning and purposeful action (see Figure 6).

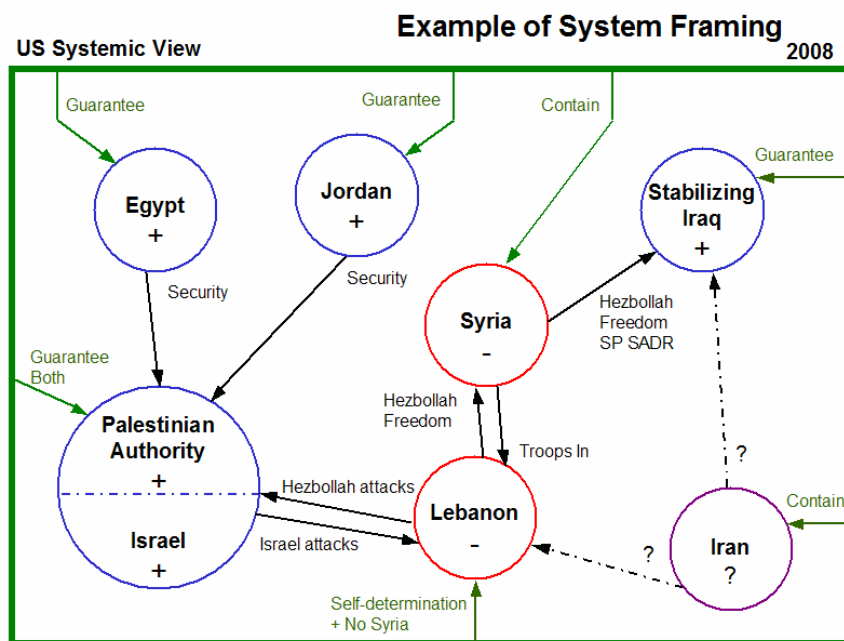


Figure 6: Example of System Framing⁷⁴

Rival as Rationale is the second domain of structured discourse. The design team seeks to identify the rival system and describe the rival's logic, behavior, and eventual form. This is accomplished by examining a range of components that interact to create the unique rival system. Specifically, the design team explores the rival culture, economics, social, strategic, command,

⁷² Christopher Bell, "Is Systemic Operation Design Capable of Reducing Significantly Bias in Operational Level Planning Caused by Military Organizational Culture?". (School of Advanced Military Studies, United States Army Command and General Staff College, Fort Leavenworth, KS, 2006.), p. 50.

⁷³ Shimon Naveh, 22 Feb 2007. Inject during SOD Workshop

learning, logistics, and operational maneuver systems. They are sensitive toward any tensions that may emerge and how they may be exploited. Additionally, the team identifies relevant actors, institutions, relationships, and structures that will become part of the strategic narrative. Since the rival has the potential to be a certain set of conditions that has emerged, rather than a nation state or non-state entity, the team suspends judgment until a holistic understanding has been achieved. Numerous visual maps may need to be created to explore the various concepts related to the rival, however a consolidated map may prove to be more useful for discourse (See Figure 7).

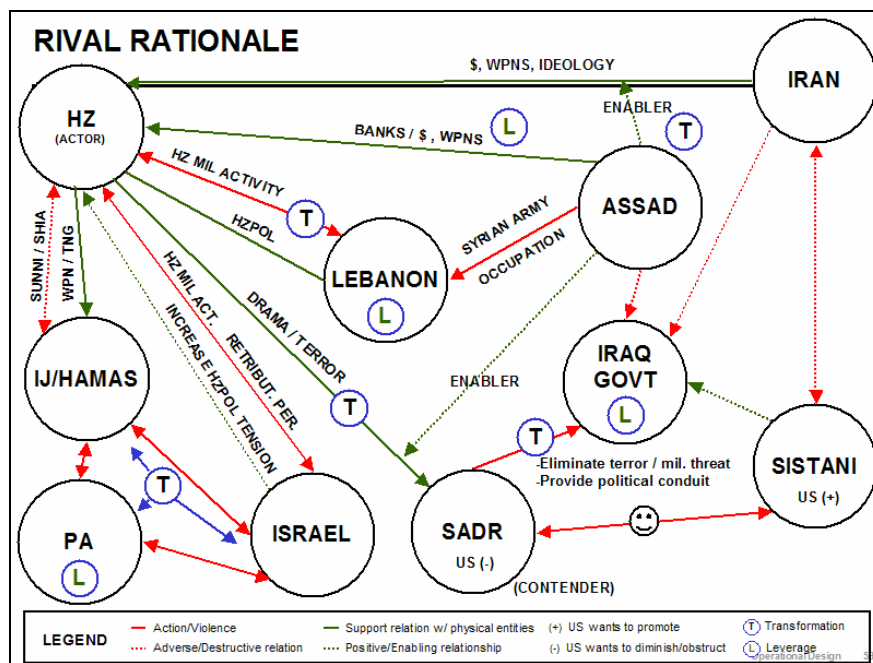


Figure 7: Example of Rival as Rational⁷⁵

The conceptualization of the rival as rationale provides a systemic reference or basis for the framing of both the system and the operations. In other words, the understandings that are achieved will be reexamined, reinterpreted, and charged with new understandings as the discourse

⁷⁴ Yancy, *SOD Primer*, 2006

⁷⁵ Ibid.

commences. As we strive to identify the sources of the rival's systemic logic, we are forming the conceptual basis for its neutralization, disruption, or dislocation.⁷⁶

Command as Rationale is the third domain of structured discourse and it serves to examine the tension between existing command structures and potential command combinations for the design. The purpose of this discourse is to develop a friendly command system that suits the logic of the system frame and is postured to learn about and conduct operations against the rival system. Indeed, military organizations are capable of changing their command and control structures, however this is usually accomplished with respect the employment and management of friendly forces. This discourse looks outside the organic command and control system and considers GA, OGA, IGO, NGO, partner nation, multinational, and coalition entities in order to achieve an information flow that enables learning and timely response. Like system framing and rival as rationale, command as rationale is subject to change in response to changes in the system.

Logistics as Rationale is the fourth domain of structured discourse. Designers rationalize friendly logistics by examining the tensions that exist between existing logistical structures and potential logistical structures required by the emerging design. Strategic mobilization considers the relations between the national strategic logistical system and the system of logistics required for the design. Strategic-operational deployability considers the organization of time, space, and resources to ensure a constant flow of resources as required by the design. Lastly, operational sustainment deals with the supporting forces required by the design.

Operation Framing is the fifth domain of structured discourse and it represents the transition from strategic logic to operational form. It narrows the focus to the operation itself and to the ideas concerning the conduct the operation. The understanding gained from system

⁷⁶ Shimon Naveh. Lecture. *Discursive Command*, accessed 18 February 2007

framing, rival as rationale, logistics as rationale, and command as rationale are all coalesced into an actionable form (see Figure 8).

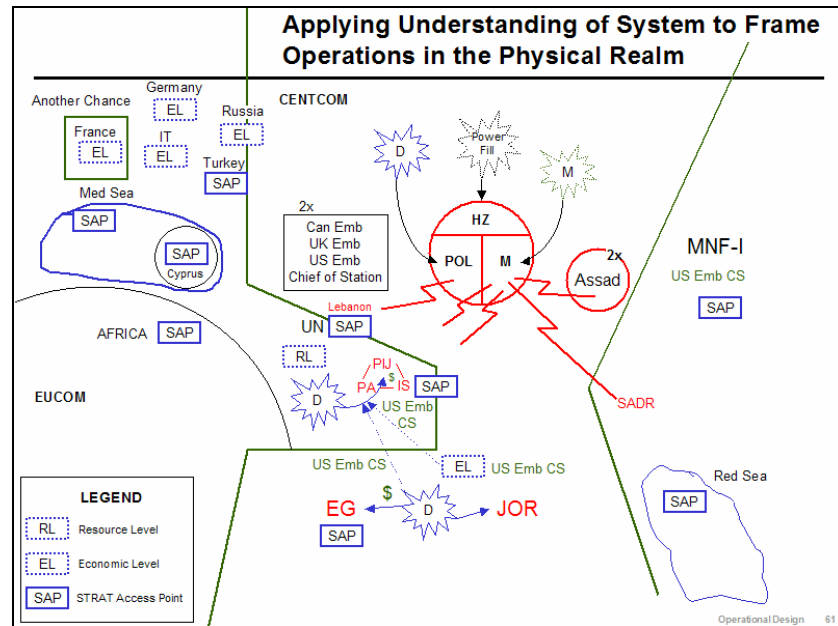


Figure 8: Example of Operational Framework⁷⁷

Operational framing articulates interim and eventual end states in accord with the strategic and operational context, establishes a coherent spatial setting for the conduct of operations, establishes a temporal setting for operations, sets the conditions for learning, and articulates the initial form of maneuver. Operational framing identifies those broad conditions that if achieved, would enable the operational form to transform the system toward desired ends. Lastly, operational framing sets the conditions for designing the operational logic and form consistent with the rationalization of the rival.

Operational Conditions is the sixth domain of structured discourse. This discourse examines the conditions within the established system logic that may transform the system toward the desired system state. Knowledge gaps are considered along with the determination of

⁷⁷ Yancy, *SOD Primer* 2006

friendly forces necessary to generate conditions consistent with the interim and eventual end states identified in operational framing. Lastly, the operational conditions discourse provides the basis for detailed course of action development in the forms of function discourse.

Forms of Function is the seventh and final domain of structured discourse where planners are brought into the discourse and detailed planning occurs. A major translation occurs whereby the operational logic, informed by the system logic, is expressed as tasks with purposes in the form of a directed course of action. Therefore, the conceptual logic resulting from the six previous discourses becomes physical in nature. However, this is not entirely a hands off discourse. As the designers convey the logic behind the design they remain open to the ideas of the planners and are prepared to modify the design if the logic calls for that action.

SOD is a difficult methodology to initially comprehend and it is not within the scope of this monograph to provide an in depth treatment on the methodology. Adding to the ambiguity associated with this methodology, there exists no single reference that explains what SOD is, how it may be applied, and how it compares to other methodologies. Appendix III (SOD Research Strategy) to this monograph proposes a strategy to embrace SOD and it is based on SOD specific references, all of which are included in the bibliography.

Assessment

SOD is a methodology with significant potential to enhance the conduct of operational design. With a unique conceptual approach and process perspective, SOD leads to designs that are based upon a foundation of reasoning and systemic understanding. SOD aims to discover the true essence of a problem in whatever form that it reveals itself. Through structured brainstorming and a highly interpersonal dialogue technique known as discourse, SOD leads to a holistic understanding of systems and their related entities and relationships. Discourse enables a conceptual bridge that links strategic and tactical spheres of thought by making the indeterminate

determinate.⁷⁸ Accordingly, a design is created only after the problem is framed and the system understood.

The SOD process requires design teams to communicate in an informal and egalitarian manner. This liberates team members from the anchor of roles and positions and allows for a rich mix of opinions. Team members quickly learn to exploit an "abundance mentality" that contributes to creative and critical thinking evidenced by an outward expression of thought and action.⁷⁹ Rather than initially focusing on termination criteria, end states, and effects, SOD projects from the initial problem frame with a focus on asking the right questions and striving to gain a systemic understanding. Learning how to ask the right questions is critical thinking at its summit. Resulting courses of action are founded more upon conceptual drivers rather than their physical manifestations. SOD therefore accounts for the complex nature of human behavior, leads to the discovery of realizable objectives, acts with justified purpose, and responds in a manner consistent with the evolving operational environment.

⁷⁸ Craig Dalton, *SOD: Epistemological Bump of the Way Ahead for Operational Design?* p. 42.

⁷⁹ Stephen R. Covey, *The 7 Habits of Highly Effective People*. (New York: Fireside Publishing, 1990), p. 220.

CHAPTER 5: ENHANCING THE JOPP

We are internally programmed towards freedom, novelty, and variety. We therefore push all of our organizational structures to the limit. The process is a pushing and pulling sequence that yanks old systems out of their comfort zones.

LTC Jim Channon, *The First Earth Battalion*

The JOPP reflects the prevailing doctrine on operational planning. It incorporates proven planning methodologies that span across the service branches accounting for their various cultures and capabilities. As discussed in this monograph, the JOPP falls short of articulating the critical function of operational design. Specifically, the 17 elements of operational design are either too force centric, overly deterministic, or simply not needed for various other reasons. They are not adequately linked to estimates or the JOPP thereby reducing their relevance and overall applicability. Fortunately, SOD, an emerging methodology that has been under research by the US Army for three years, represents a valuable source from which a new approach to operational design can be developed and integrated into the JOPP.

Service Initiatives

The US Army is currently circulating the Field Manual (FM) 3-0 (Full Spectrum Operations) DRAG. One remarkable inclusion is the discussion on operational design (see figure 9). The Army clearly realizes the value of the SOD and its approach to framing. Strategic guidance is put through a rigorous examination to ensure end states, conditions, and centers of gravity are feasible, acceptable, and as complete as possible. The Army has streamlined the elements of operational design to reflect only those critical elements that have proven to characterize operational design in the context of current threats.

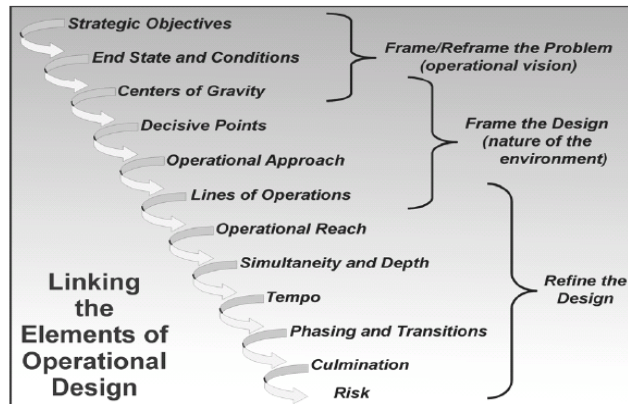


Figure 9: Framing the Elements of Operational Design⁸⁰

The Marine Corps MCWP 3-33.5 (Counterinsurgency) has also embraced SOD principles by including a discussion on discourse as a part of the iterative counterinsurgency campaign design (See Figure 10). Consistent with SOD and joint doctrine, a high regard for systems thinking is maintained to ensure that knowledge and understanding is holistic and reflective of the operational environment. MCWP 3-33.5 also discusses considerations for design which include critical discussion, systems thinking, model making, intuitive decision making, continuous assessment, and structured learning - constructs taken directly from SOD.⁸¹

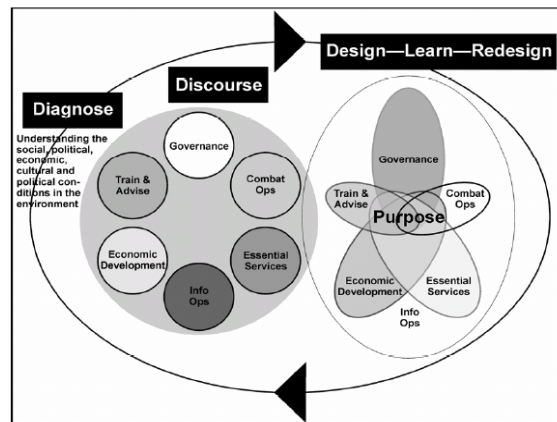


Figure 10: Counterinsurgency Design⁸²

⁸⁰ FM 3-0 DRAG

⁸¹ MCWP 3-33.5 (Counterinsurgency)

⁸² FM 3-23/MCWP 3-33.5 (Counterinsurgency)

The Designing Based Approach (DBA)

To glean components from SOD and provide recommendations for the enhancement of the JOPP, a Designing Based Approach (DBA) theory is proposed. The DBA is a theory that blends the critical components of SOD into the JOPP construct while introducing new terms and concepts to enhance the JOPP. DBA includes the SOD primary components of system framing, operational framing, and the discourse communication method. As illustrated in Figure 11 (SOD-JOPP Prototype), the JOPP 7-step framework remains unchanged.

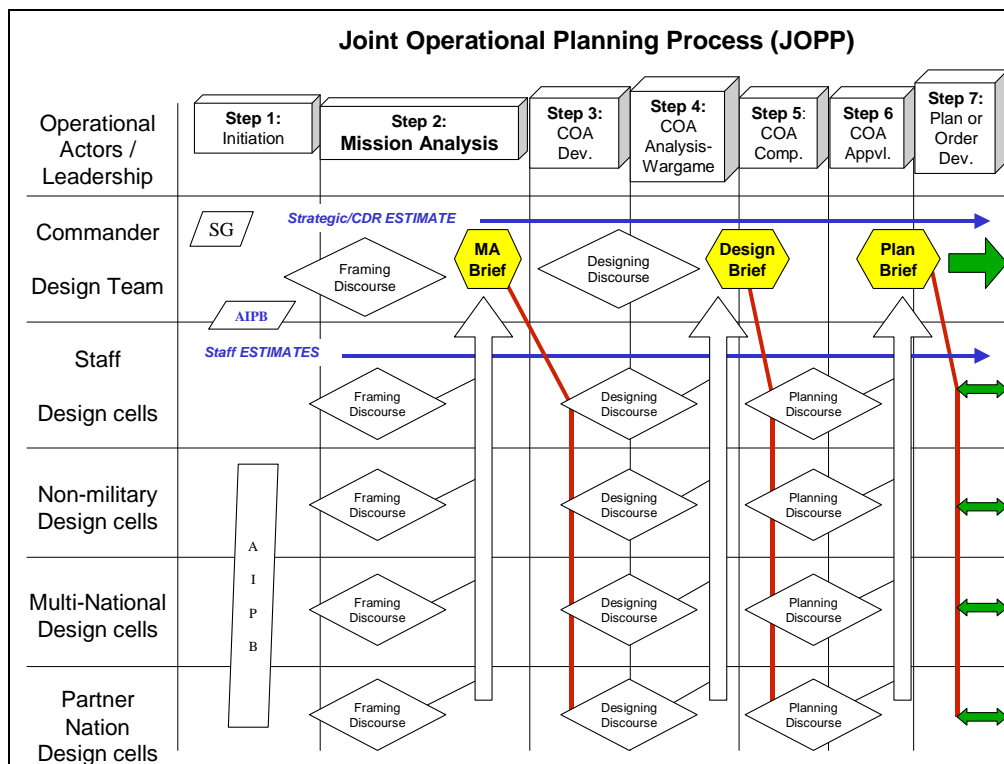


Figure 11: SOD-JOPP Prototype

Strategic Guidance (SG) is received and estimates are initiated during Step 1, however an Abbreviated Intelligence Preparation of the Battlefield (AIPB) is immediately delivered to the primary design team to enable a framing discourse. The commander is a part of the primary design team, which may include members from the various staff sections to include liaisons from the various cells depicted in the left column. Other design cells receive a consolidated AIPB to

enable their framing discourse. The command and staff along with other operational actors are engaged in framing the problem throughout Step 2.

A Mission Analysis (MA) brief is conducted in a review manner where bottom up feedback contributes to the shared understanding of all discourse members. A critical output from the MA brief is the commander's guidance that will inform the subsequent designing discourse. Step 3 and 4 represent the designing discourse where concepts begin to take form and bottom up feedback is presented in the design brief. Again, the critical output from the design brief is the commander's guidance that will inform the planning discourse. Steps 5 and 6 are open for the consideration of multiple courses of action, however the planning discourse may not require that option. Final operational framing discourses are conducted ensuring a seamless transfer of understanding during the planning discourse. Bottom up feedback is presented during the plan brief and commander's guidance informs the development of plans and orders.

This SOD-JOPP prototype proposes a framework for the implementation of SOD discourse to compliment and supplement the JOPP where and when appropriate. It leverages the operational actors and leaders who may have a role in the operation. They are part of the ongoing discourse and their perspective is valued and considered resulting in "buy in" and "plan ownership" at the lowest and most distanced elements. While the joint elements of operational design are available for consideration during the SOD/JOPP process, their utility may be limited given the diverse nature of the operational actors. For this reason, the DBA recommends a sweeping review and change.

The leadership of military operational forces rests on the shoulders of operational commanders. However, the employment of military forces occurs in an operating environment where many other actors, both military and nonmilitary, possess invaluable knowledge, understanding, capability, and power that must be embraced, influenced, and directed toward the accomplishment of strategic and operational ends. The DBA acknowledges this implicit feature

of the operational environment and views the collective acts of leadership as a principal activity underpinning the DBA model (see Figure 12).

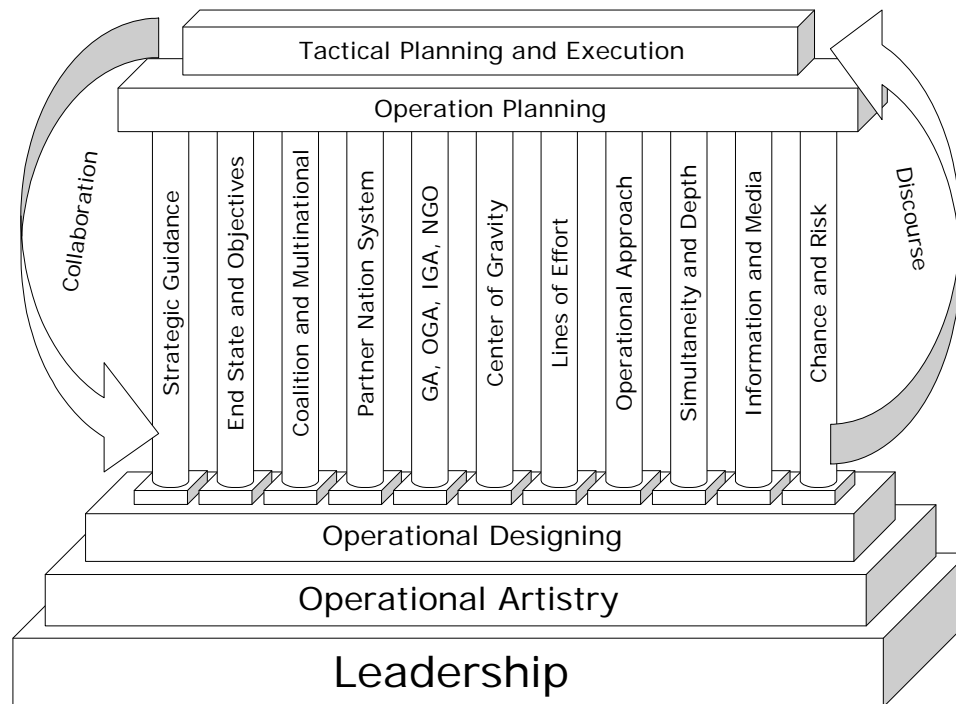


Figure 12: Designing Based Approach - Pillars of Operational Design

Communication, coordination, resource allocation, and decision-making further characterize the DBA and reflect another critical activity called operational artistry. Operational artistry refers to the application of creative imagination by operational actors - supported by their skill, knowledge, and experience - to collectively design major operations and to organize and employ their assets accordingly. While operational commanders are the overriding leaders and force providers, the integration of other operational actors is required to ensure a broad range of perspectives and capabilities.

The DBA focuses at the operational level of command where a critical bridging function links strategy to tactics. Figure 12 illustrates this bridge with supporting pillars linking

operational designing to operational and tactical planning. A brief explanation of the pillars follows.⁸³ *Strategic Guidance* provides invaluable input from the CCCR, CJCS, SecDef, or POTUS. This guidance informs system framing. *End State and Objectives* are examined as a part of every discourse however they are solidified during the design discourse. *Coalition, Multinational, GA, OGA, IGA, and NGO* actors all formulate and inject their perspective into the discourses and briefs. These operational actors and their input must be a critical consideration during operational design. The *Partner Nation System* is another critical actor that injects their perspective. Additionally, the partner nation system provides the substance for the intelligence network and while it serves as the primary focus for system understanding.

Centers of Gravity, Lines of Effort, and Simultaneity and Depth inform and guide designing and planning discourses. *Operational Approach* incorporates the traditional design elements of forces and functions; arranging operations; timing and tempo, decisive points; effects; direct and indirect approach, physical lines of operational, operational reach, culmination, and leverage. *Information and Media* represent critical modes of communication that must be considered particularly during the designing discourse. Similarly, *Chance and Risk* assist in the development of potential actions during the designing and planning discourses. Chance and risk include the traditional elements of anticipation, balance, and synergy.

Collaboration and discourse characterize the DBA by facilitating the flow of communication. Collaboration is broadly viewed as the act of working together to achieve a common goal. It is accomplished by many means to include direct and indirect communications and it is assumed that individuals or groups possess special knowledge or understanding that could potentially benefit other individual or group efforts to achieve a goal. As it pertains to the

⁸³ An exhaustive explanation of the DBA is not within the scope of this monograph. Figures 11 and 12 serve to illustrate the comprehensive and innovative basis of the theory while a brief explanation of the major terms and concepts are merely introduced.

DBA, collaboration is an open and continuous dialogue among the operational actors that enables them to gain a shared understanding of the operational environment. Collaboration is accomplished primarily during structured meetings both in person and over videoconference, but it is increasingly conducted over extensive and interactive networks. For example, major Army commands use special software systems to include the Combined Arms Planning and Execution-Monitoring System (CAPES) and Command Post of the Future (CPOF), which enable a highly sophisticated form of collaboration.

Discourse is another complimentary form of communication that is more personalized, less structured, and fueled by learning and creation through a dialectical process. The approach to a discourse is less focused on the concrete, physical manifestations that exist in the operational environment and more focused on conceptual, rational, and logical constructs. As it pertains to the DBA, discourse is a more closed, iterative activity that also strives for shared understanding of the operational environment, however the understanding is of a different form than collaboration. Thus, both collaboration and discourse are used to inform and guide the operational actors as they practice operational artistry.

Recommendations

Regarding *doctrine*, the DBA should be reviewed and considered for integration into joint doctrine. A systems perspective emphasis should be maintained in joint doctrine, however it should be expanded to reflect relationships as articulated in SOD. The USJFCOM should develop a JP 6-0 that articulates "Joint Operational Command" similar to how the service branches have illustrated their commander roles and functions. The role of the commander should be unique given the CCDR/JFC span of influence to include non-military personnel, multinational forces, partner nation police and military force. USJFCOM should receive, develop, and indoctrinate the DBA in the same manner that it has embraced EBA. The first publication should be a Joint Warfighter Center (JWC) Pamphlet titled, "Doctrinal Implications

of the Design Based Approach (DBA). While SOD certainly qualifies as a good idea, the unique contribution it makes to the planning process is its framing and discourse functions. This pamphlet would reflect a new DBA that should be co-developed by JFCOM and TRADOC.

Regarding *training*, the operational actors should receive education and training on critical thinking, logic, and discourse methods. Operational actors and Battle Staff NCOs should be trained to operate the Global Synchronization Tool (GST) software, facilitate discourse sessions, operate visual mapping hologram software, and conduct in-house train the trainer programs. Regarding *material*, command center networks should have adequate bandwidth to maximize the use of collaboration software, i.e. CAPES and CPOF. Visual mapping hologram software should be developed and fielded. Each operational actor should authorize the GST for use and it should be modified to merge with the assessment system software. Likewise, *facilities* should be large enough to display dry erase boards and be able to employ visual mapping hologram software.

Regarding *leadership*, operational commanders should expand their planning and decision-making processes to include other military and nonmilitary leaders or their designated representatives. Operational commanders should seek to maximize the incorporation of collaboration and discourse methods and systems. Operational commanders and staffs should lead primary and secondary design teams. Regarding personnel, operational actors should be knowledgeable and skilled in the JOPP, collaboration methods and systems, and discourse techniques. Battle Staff NCOs should be skilled in facilitating discourse sessions, and operating visual mapping hologram software.

Conclusion

Joint doctrine, specifically JP 3-0 and 5-0 fall short of providing relevant and current joint doctrine that articulates the critical function of operational design and its role in the Joint Operational Planning Process (JOPP). Specifically, most of the 17 elements, as defined and

applied in joint doctrine, are either too force centric, overly deterministic, or simply not relevant for various other reasons as discussed in Chapter 3. The elements of operational design are not adequately linked to estimates or the JOPP thereby reducing their relevance and overall applicability.

SOD has the potential to enhance the JOPP particularly with respect to the application of operational design. SOD offers a unique conceptual approach and process perspective that leads to designs that are based upon a foundation of reasoning and systemic understanding. Unlike the JOPP that uses primarily the elements of operational design to create designs, SOD aims to discover the true essence of a problem, in whatever form that it reveals itself, and gain a holistic understanding of systems and their related entities and relationships. SOD therefore accounts for the complex nature of human behavior, leads to the discovery of realizable objectives, acts with justified purpose, and responds in a manner consistent with the evolving operational environment. Through the DBA, SOD can indirectly enhance the JOPP by the application of the SOD-JOPP prototype and the Pillars of Operational Design, resulting in operational design methods that are coherent and complete.

APPENDIX I - GLOSSARY

Part I - Abbreviations and Acronyms

AIBP abbreviated intelligence preparation of the battlefield
CCDR combatant commander
CCIR commander's critical information requirement
CJCS Chairman of the Joint Chiefs of Staff
COG center of gravity
CPOF command post of the future
DBA design based approach
EOD - elements of operational design
JIPOE joint intelligence preparation of the operational environment
JOPP joint operation planning process
SOD systemic operational design

Part II - Terms and Definitions

assessment. 1. A continuous process that measures the overall effectiveness of employing joint force capabilities during military operations. 2. Determination of the progress toward accomplishing a task, creating an effect, or achieving an objective.

center of gravity. The source of power that provides moral or physical strength, freedom of action, or will to act. Also called COG. See also critical capability; critical requirement; critical vulnerability.

cognitive. Of, relating to, being, or involving conscious intellectual activity (as thinking, reasoning, or remembering) (SOD).

collaboration. The act of sharing data, information, knowledge, perceptions, ideas, and concepts to enable understanding, visualizing, and describing.

deterministic - An application of the philosophical doctrine of determinism that asserts that every event, including human cognition, decision and action, is causally determined by an unbroken chain of prior occurrences.

emergence. The act or an instance of emerging; any of various superficial outgrowths; penetration of the surface by something new (SOD)

form. The shape and structure of something as distinguished from its material; the essential nature of a thing as distinguished from its matter; a standard or expectation based on past experience.

frame. To construct by fitting and uniting the parts of the skeleton of; to give expression to; to fit or adjust especially to something or for an end.

logic. Reasoned and reasonable judgment; the principles that guide reasoning within a given field or situation. A system of reasoning.

logical. Capable of or reflecting the capability for correct and valid reasoning. Marked by an orderly, logical, and aesthetically consistent relation of parts. Based on known statements or events or conditions. Capable of thinking and expressing yourself in a clear and consistent manner.

objective. 1. The clearly defined, decisive, and attainable goal toward which every operation is directed. 2. The specific target of the action taken (for example, a definite terrain feature, the seizure or holding of which is essential to the commander's plan, or, an enemy force or capability without regard to terrain features).

paradigm. An outstanding clear or typical example or archetype; a philosophical or theoretical framework of any kind.

rationalized. To bring into accord with reason or cause something to seem reasonable; to attribute (one's actions) to rational and creditable motives without analysis of true and especially unconscious motives.

strategy. A prudent idea or set of ideas for employing the instruments of national power in a synchronized and integrated fashion to achieve theater, national, and/or multinational objectives.

symbiotic relationship - A relationship between two entities which is mutually beneficial for the participants of the relationship. Thus there is a positive-sum gain from cooperation. This is a term commonly used in biology to explain the relationship between two entities that need each other to survive and prosper. (Merriam Webster)

system. A functionally, physically, and/or behaviorally related group of regularly interacting or interdependent elements comprising a unified whole: instrumentality that combines interrelated interacting artifacts designed to work as a coherent entity; a procedure or process for obtaining an objective; an ordered manner; orderliness by virtue of being methodical and well organized.

system framing. Grouping independent but interrelated elements into a unified whole.

systemic. Affecting an entire system.

temporal. Of or relating to time as opposed to eternity; of or relating to time as distinguished from space.

tension. Feelings of hostility that are not manifest. The physical condition of being stretched or strained; A balance between and interplay of opposing elements or tendencies (especially in art or literature); (physics) a stress that produces an elongation of an elastic physical body.

APPENDIX II - EOD ASSESSMENT

Design elements are tools to help commanders and their staffs visualize the campaign or operation and shape the concept of operations. Their purpose is to enable a linkage between strategic ends and tactical means by the determination and application of operational ways. The elements of operational design fall into four basic categories. They are *guiding*, descriptive of a *system*, cast in the realms of *time and distance*, and/or oriented upon *execution*. A brief assessment follows as it detailed in Chapter 3 of this monograph.

Guiding:

Termination - deterministic, irrelevant

End state - relevant

Objectives - relevant

Physical Lines of operation - force centric, limited in application

Logical Lines of operation - relevant

Direct and indirect - force centric

System:

Center of gravity - relevant

Effects - deterministic, limited in application

Decisive points - relevant, but may be a subset of centers of gravity

Time and Distance:

Simultaneity - relevant

Depth - relevant

Timing - relevant, but can be a subset of operational approach

Tempo - relevant, but can be a subset of operational approach

Operational reach - relevant, but can be a subset of operational approach

Culmination - relevant, but can be a subset of operational approach

Arranging operations - relevant, but can be a subset of operational approach

Execution:

Forces and functions - limited in application

Leverage - relevant, but can be a subset of operational approach

Anticipation - relevant, but can be a subset of chance and risk

Balance - relevant, but can be a subset of chance and risk

Synergy - relevant, but can be a subset of chance and risk

Assessment: Of all of the elements, only end states and objectives, logical lines of operation, center of gravity, and simultaneity and depth merit inclusion into what would be sound and highly relevant elements of operational design. The DBA theory described in Chapter 5 applies this assessment.

APPENDIX III - SOD RESEARCH STRATEGY

Systemic Operational Design (SOD) is a relatively new methodology that has been under intense research since 1998. Numerous references have been produced to define what SOD is, explain how it may be applied, and speculate as to its advantages compared to other methodologies. Unfortunately, many of these references are unpublished and one must rely on student monographs, PowerPoint presentations, and lecture notes in order to gain an understanding of this fascinating methodology. This appendix will highlight some of those references and recommend a strategy for engaging them.

Introductory References

The first reference that one should read in order to gain an initial understanding of SOD is *There's More to Coalition Life Than Strategy and Tactics: Systemic Innovation at the Operational Level of War* by Major CJ Bell SG, and Major AM Roe GH. In four short pages, the authors introduce and explain SOD, contrast SOD to existing methodologies, and project the future application of SOD in the British Army. Numerous SOD concepts to include systemic shock, temporal design, egalitarianism, feedback loops, discourse, and general systems theory are briefly addressed that build the SOD context and lexicon. Bertalanffy's *General System Theory* is cited which serves as a foundational theoretical reference for SOD. Naveh's *In Pursuit of Military Excellence* is cited explain the linkage between a systemic approach and operational logic.

The second reference that one should read in order to gain an understanding of how the US Army seized and applied SOD is *Systemic Operational Design Primer* by Lieutenant Colonel Reb Yancey. This 63-slide PowerPoint briefing discusses the challenges associated with complexity, anchoring, wicked problems, effects based operations, and of course the US Army culture. Yancey effectively illustrates visual mapping in slides 37 to 43 and system framing in

slides 54 to 62. While he emphasizes the difference between designing and planning, he maintains that ultimately "SOD compliments rather than substitutes for planning."

The third reference that one should read in order to build on their basic understanding of SOD is *Systemic Operational Design: An Introduction* by Sorrells, et al. This sizable 103-page monograph represents the collective work of six School of Advanced Military Studies (SAMS) students and it was composed after their participation in the Unified Quest (UQ) 2005 exercise. The actual base content of the monograph is only 46 pages, therefore the appendices comprise the bulk of the monograph. Arguably, if one had only the time to read one SOD reference, this would be the most recommended. This monograph introduces the conceptual components of tension, emergence, and strategic raid on pages 17 to 22. The SOD model is briefly addressed on pages 23-28. A discussion on issues, integration, and limitations associated with SOD is located on pages 35 to 46 enabling one to deduct the challenges associated with the adoption of SOD in its pure form. Finally, Appendix II provides a concise review of related theory and Appendix IV details the SOD Structuring Questions developed by Naveh and OTRI. A review of the structuring questions allows one to gain an appreciation for the complicated, underlying SOD theory in an applicative sense.

The short article, PowerPoint briefing, and monograph cited in this section provide a basic introduction to SOD. It is recommended that these references are initially scanned, later read, and constantly referred to as one learns about SOD. The next section will assume one's command of these introductory references.

Advanced References

The most comprehensive application of SOD theory is articulated in, *A Systemic Concept for Operational Design* by John F. Schmitt. Schmitt provides a concise work that effectively applies most of the SOD components to include complex systems, operational design, governing logic, problem setting, iterative inquiry, wicked problems, model making, and conversational

discourse. Schmitt does not cite SOD specifically, but it is obvious that he borrowed the bulk of his theory from SOD.

Of the six monographs that specifically cover SOD, the one that provides the greatest depth related to the application of SOD is *Systemic Operational Design: Gaining and Maintaining the Cognitive Initiative* by Major Ketti C. Davison. Her chapter titled *Potential Doctrine* incorporates original source material that effectively introduces the deep theory behind SOD. The remaining monographs describe SOD to varying degrees but focus more on its current application, its relationship to other methodologies, and/or its potential future integration.

As one strives to understand what SOD is, the quest can be informed by learning what SOD is not. In his *Emerging Doctrine and the Ethics of Warfare*, Dr. Tim Challans provides a balanced comparison and contrast between the prominent Effects Based Operations (EBO) theory and SOD. This brief 10 page article critically examines the effects based approach, applies moral theory, and effectively asserts that the effects based approach is a mere decision procedure whereas SOD is a critical method. He cites *A Treatise on Efficacy: Between Western and Chinese Thinking* by Francois Jullien which is a remarkable work that addresses critical concepts to include theory and practice, the propensity of things, and the logic of manipulation.

Other References

While the Command and General Staff College (CGSC) and SAMS courses address the "systems perspective" associated with the Effects Based Approach (EBA), Operational Net Assessment (ONA) process, and Systems of Systems Analysis (SOSA) methodologies, Ludwig von Bertalanffy's *General Systems Theory: Foundations, Development, Applications* provides a critical theoretical background. Specifically, Chapter 2 explains the feedback loop and Chapter 6 provides a remarkable discussion on open systems and its associated system states.

Visual mapping is a critical component of SOD yet there are few references that articulate what it is and how to do it. Jamshid Gharajedaghi's second edition of *Systems*

Thinking: Managing Chaos and Complexity provides extensive coverage on mapping systems and optimizing them for application. Specifically, Chapters 5 and 6 cover systems methodology and defining the problem which provide not only a powerful perspective but also a depth of understanding in terms of systems thinking.

Discourse is another critical component of SOD and *The Fifth Discipline* by Peter M. Senge provides an insightful discussion on the topic of dialogue and discourse pages 221 to 232. Chapter 7 covers mental models and the overall theme of organizational learning is consistent with SOD's emphasis on learning from systemic emergences and system injects. Accordingly, *Systems Thinking for Integrated Operations* by Major Robert Dixon is a monograph that incorporates Senge's perspective as it relates to SOD on pages 44-46.

Conclusion

Researching SOD will require one to review references in order to gain a foundation of knowledge. This chapter only highlights references found to be relevant to the quest. Initial command of the SOD process and vocabulary is enabled by the introductory references. Understanding how to apply SOD, gaining relevant depth, and appreciating the scope and potential of SOD is enabled by the advanced references. Finally, SAMs core readings such as *How We Think* by John Dewey and *The Logic of Failure* by Dietrich Dorner along with other references serve to inform an education comprising SOD theory and practice. This appendix highlights those references proven to be useful while providing a strategy to engage them.

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